



Thismia panamensis: first record of Thismiaceae for the Brazilian Cerrado in Goiás state

Frederico Augusto G. Guilherme^{1*}, Christiano Peres Coelho¹, Eric de Camargo Smidt², Daielle Carrijo Gomes¹ and Luzia Francisca de Souza¹

1 Universidade Federal de Goiás, Regional Jataí, Instituto de Biociências, Herbário Jataiense, BR 364 / Km 192, Jataí, GO, 75801-615, Brazil

2 Universidade Federal do Paraná, Departamento de Botânica, Setor de Ciências Biológicas, Caixa Postal 19031, Curitiba, PR, 81531-990, Brazil

* Corresponding author. E-mail: fredericoagg@gmail.com

Abstract: We describe the first occurrence of the family Thismiaceae in the Brazilian Cerrado and a new record of *Thismia panamensis* (Standl.) Jonker for Brazil. We found the species in an urban fragment of semideciduous forest, municipality of Jataí, southeastern Goiás state, Central Plateau Brazil. The record of this achlorophyllous mycoheterotrophic monocot is important, improving the knowledge of the flora of Cerrado domains and giving a better understand of the biogeography of Brazilian mycoheterotrophic angiosperms.

Key words: Brazilian savanna; mycoheterotrophic monocot; new records; semideciduous forest

Thismia Griff. consists of ca. 54 achlorophyllous mycoheterotrophic herbaceous plants, typically growing among leaf litter on the shady wet forest floor (Maas et al. 1986; Nuraliev et al. 2014). The genus has a Pantropical distribution with two main centers of biodiversity: Southeast Asia and the Atlantic Rain Forest of South America (Jonker 1948; Mancinelli et al. 2012). For Brazil, there are records of ten species of *Thismia*, of which six are endemic and occur mainly in some patches of the Atlantic Rainforest and Amazonian domains (Forzza et al. 2010). Therefore, there is a gap of occurrence of Thismiaceae between the Amazonia and the Atlantic Rainforest, which is covered by the Brazilian Cerrado. Because of its rare occurrence and very small habit, some authors have made new descriptions of this genus and new distributions in recent years (e.g., Dančák et al. 2013; Voloschen et al. 2013; Truong et al. 2014).

The Cerrado biome originally covered about two million square kilometers or 21% of Brazil. It is located between 5°S to 20° S and 45° W to 60° W (Ribeiro and Walter 2008) and is almost fully inserted in the Central Plateau, that showed the highest rates of human interference because of cattle-ranching and

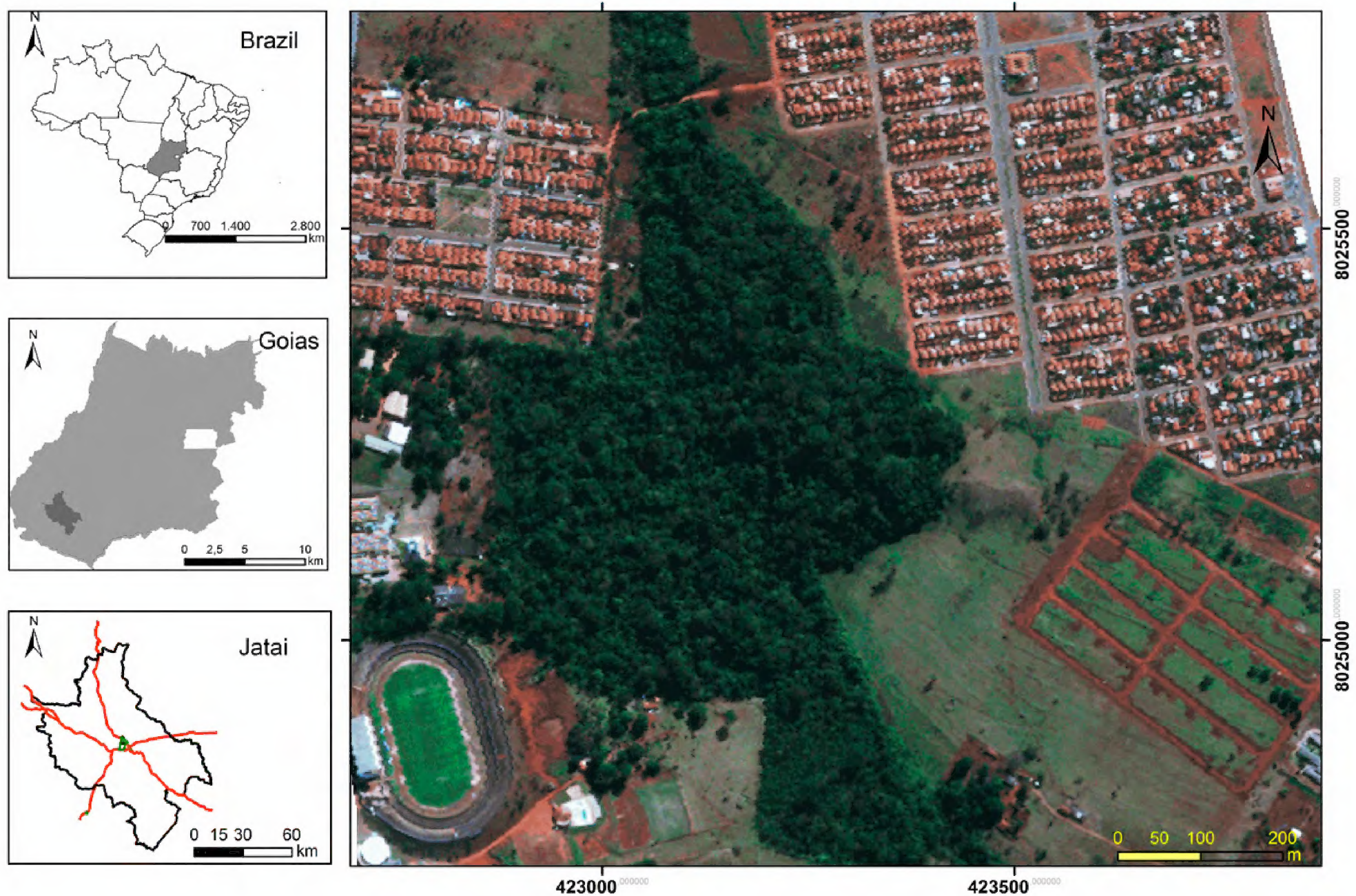
deforestation for agriculture (Bridgewater et al. 2004). The vegetation consists of a mosaic with herbaceous, savanna and forest formations, which are delimited by climate, soil properties, fire and water table depth.

The first record of Thismiaceae to the Brazilian Cerrado was made in an urban forest fragment of approximately 30 ha, known as 'Mata do Açude' (17°51'S, 051°43'W), located in the Paraná Basin, municipality of Jataí, southeastern Goiás state (Figure 1). The fragment is typically composed of gallery forest and semideciduous forest, with indistinguishable boundaries between these vegetation types. The fragment has several degradation levels and suffers constant actions of the surrounding residents. There are obvious traces of disturbances like trash along trails and mainly recurrent fires, which have severely suppressed the maintenance of native plant species in the remnant. During a floristic survey conducted at the site, were reported 225 plant species (Gomes and Guilherme, unpublished data).

With the assistance of the literature (Maas et al. 1986; Mancinelli et al. 2012; Voloschen et al. 2013), we have identified the species as *Thismia panamensis* (Standl.) Jonker (Figure 2). We found the species with flowers between February and April, and fruits between March and May of 2013 to 2015. Several individuals were collected and stored in 70% ethanol, and deposited in the Herbarium Jataiense (HJ), Universidade Federal de Goiás.

Material examined: Brazil, Goiás: municipality Jataí; Souza, L.F (collector number 6026). Voucher: 6768 (HJ).

Jonker (1938) originally described the species and Maas et al. (1986) distinguish *T. panamensis* by its strongly zygomorphic floral tube and horizontal throat, a whorl of six tepals, of which three are linear-triangular. *Thismia panamensis* (Standl.) Jonker (Monogr. Burmann. 1938: 234) is a terrestrial, achlorophyllous and mycoheterotrophic herb. Tuber ovoid to narrowly ovoid and white colored. Branched roots and erect



Source: Geoeye Image (1B2C3R), May 2010. Resolution 2 m.

Author: Geoinformation Laboratory - UFG / Jataí

Figure 1. Geographic distribution of the new record of *Thismia panamensis* and detail of the urban fragment (Mata do Açude), Jataí, Goiás state, Brazil.

simple (seldom two) stem with a solitary flower. Floral tube whitish tinged with greenish brown to colorless, strongly zygomorphic. Shortest tepals whitish and inserted just below the annulus. Largest tepals whitish to purplish pink with filiform appendage. The gibbous part of the tube have three longitudinal slits. Stamens 6, pendulous and form a tube around the style. Stigma 3-lobed, short and globose. Fruit is cup-shaped formed by the basal swellings of the floral tube. Other detailed description and a good illustration of the species may be found in Maas et al. (1986, Figure 70, page 154). Such descriptions are closely related to the morphological features of the plant observed in this study.

Until this record, *T. panamensis* was reported only in Bolivia, Ecuador, Colombia, Costa Rica and Panamá (W³Tropicos—Missouri Botanical Garden 2012). Therefore, it is the first record of the species for Brazil. According to Maas et al. (1986), the species blooms from June to September and is restricted to the Amazonian forest formations. Although it presents a zygomorphic floral tube and light purple coloring, the small size, combined with abundant leaf litter of the forest, makes individuals very inconspicuous in nature (Figure 2). *Thismia panamensis* has relatively large slits near the base of the floral tube that can function as dispersing access to

insects (Maas et al. 1986). Fruits are dispersed by birds and the seeds by insects, as suggested by Croat (1978). However, previous observations for the species in this urban fragment have pointed to a seed dispersion by rain splash, as documented by Mar and Saunders (2015), for *T. hongkongensis* in China.

Thismiaceae is a family with few and sparse plant collections and new distributional records are essential to understand the true ranges of species. The constant human interventions in this urban fragment (Mata do Açude) may hinder the maintenance of *T. panamensis*. However, this finding is important because it helps to increase the knowledge about the species and contribute to other studies such as conservation biology and biogeographical distribution of Cerrado plants. One main explanation for such disjoint populations is the fact that the genus *Thismia* consists in a group of very inconspicuous plants. In addition, there are still few studies on forest formations in the Central Plateau in the Brazilian Cerrado which encompass not only surveys of woody vegetation but also all life forms. Thus, we believe this clearly shows the importance of an improvement in the floristic studies for this forest fragment and highlights the importance of funding for fieldwork in poorly sampled areas in Brazil.

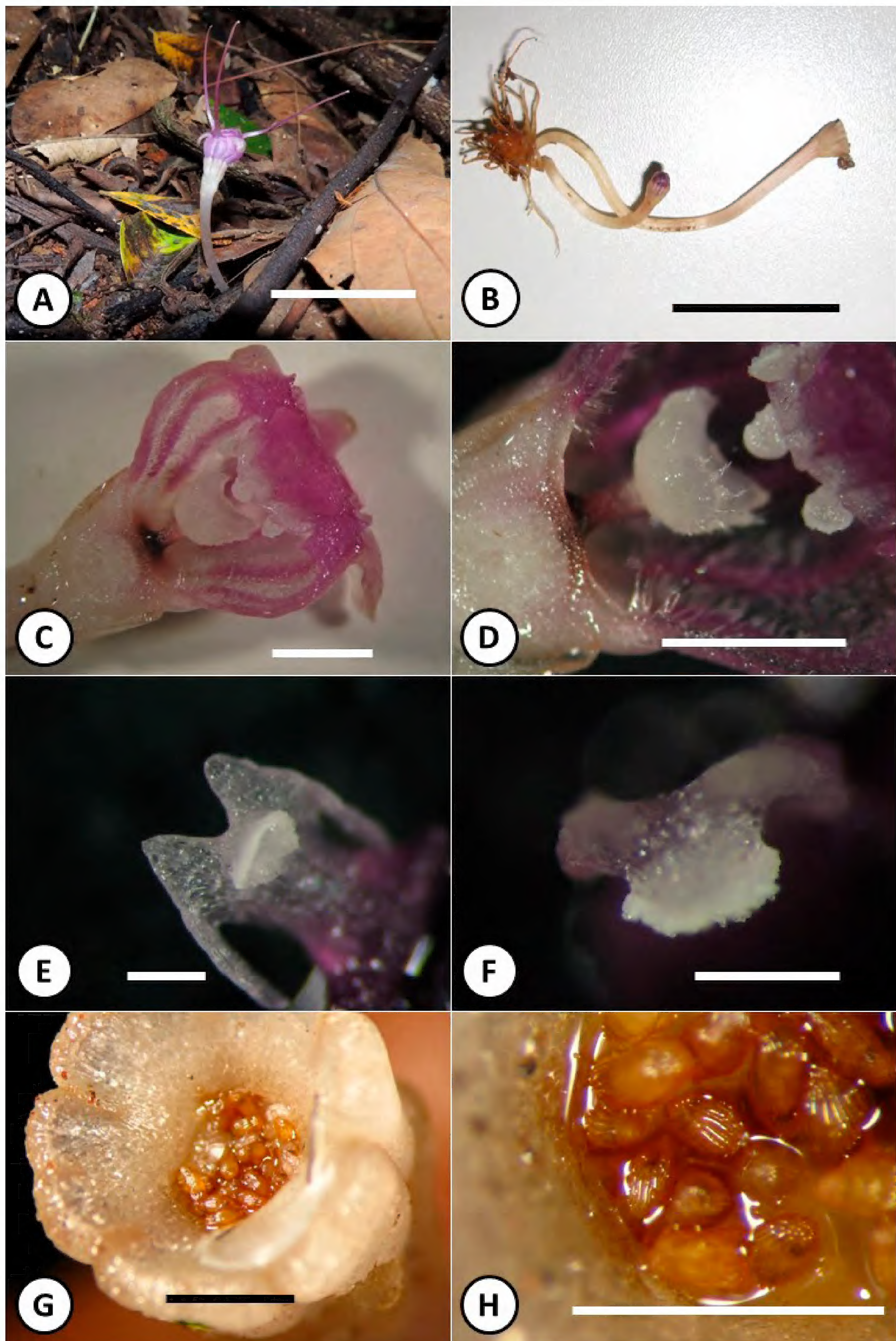


Figure 2. *Thismia panamensis* (Standl.) Jonker. **A.** Habitat and flower; **B.** Habit with roots and stems; **C.** Longitudinal section of the flower showing the stamens, style, stigma, and ovary; **D.** Close up of stamens and stigma. **E.** Close up of the mature stamen; **F.** Close up of the mature anther; **G–H.** Close up of the fruit cup, inside view with the seeds. Scale bar: A and B = 5 cm, C and D = 5mm, E and F = 1 mm, G and H = 3 mm. (A–H: Voucher - 6768 HJ).

ACKNOWLEDGEMENTS

Financial support was provided by Projeto PELD Jataí, Pesquisas Ecológicas de Longa Duração (CNPq/FAPEG, 2012/10267001108). FAGG and ECS are thankful to Brazilian Research Council (CNPq) for a Productivity Grant. We thank Alécio Perini for the help in preparing images.

LITERATURE CITED

- Bridgewater, S., J.A. Ratter and J.F. Ribeiro. 2004. Biogeographic patterns, β -diversity and dominance in the Cerrado biome of Brazil. *Biodiversity and Conservation* 13: 2295–2318. doi: [10.1023/B:BIOC.0000047903.37608.4c](https://doi.org/10.1023/B:BIOC.0000047903.37608.4c)
- Croat, T.B. 1978. *Flora of Barro Colorado Island*. Stanford, CA: Stanford University Press. 943 pp.
- Dančák, M., M. Hroneš, M. Sochor, L. Koblíková and R. Hedl. 2013. A new species of *Thismia* (Thismiaceae) from Brunei Darussalam, Borneo. *Phytotaxa* 125: 33–39. doi: [10.11646/phytotaxa.125.1.5](https://doi.org/10.11646/phytotaxa.125.1.5)
- Forzza, R.C., J.F.A. Baumgratz, C. Bicudo, D. Canhos, A. Carvalho, A. Costa, D. Costa, M. Hopkins, P. Leitman, L. Lohmann, E. Lughadha, L. Maia, G. Martinelli, M. Menezes, M. Morim, M. Nadruz-Coelho, A. Peixoto, J. Pirani, J. Prado, L. Queiroz, V. Souza, J. Stehmann, L. Sylvestre, B. Walter and D. Zappi. 2010. Síntese da diversidade brasileira — Introdução; pp. 21–42, in: R.C. Forzza (ed.). *Catálogo de plantas e fungos do Brasil*. Rio de Janeiro: Andrea Jakobsson Estúdio.
- Jonker, F.P. 1938. A monograph of the Burmanniaceae. Mededelingen Botanisch Museum en Herbarium. Rijks University. Utrecht 51: 1–279.
- Jonker, F.P. 1948. Burmanniaceae; pp. 12–26, in: C.G.G.J. van Steenis (ed.). *Flora Malesiana* 1(4). Leiden: National Herbarium of the Netherlands.
- Maas, P.J.M., H. Maas-van de Kamer, J. van Benthem, H.C.M. Snelders and T. Rübsamen. 1986. Burmanniaceae. *Flora Neotropica Monograph* 42: 1–189.
- Mancinelli, W.S., C.T. Blum and E.C. Smidt. 2012. *Thismia prataensis* (Thismiaceae), a new species from the Brazilian Atlantic rain forest. *Systematic Botany* 37: 879–882. doi: [10.1600/036364412X656545](https://doi.org/10.1600/036364412X656545)
- Mar, S.S. and R.M.K. Saunders. 2015. *Thismia hongkongensis* (Thismiaceae): a new mycoheterotrophic species from Hong Kong, China, with observations on floral visitors and seed dispersal. *PhytoKeys* 46: 21–33. doi: [10.3897/phytokeys.46.8963](https://doi.org/10.3897/phytokeys.46.8963)
- Missouri Botanical Garden. 2102. Missouri Botanical Garden-W³ TROPICOS. Nomenclatural Data Base.
- Nuraliev, M.S., A.S. Beer, A.N. Kuznetsov and S.P. Kuznetsova. 2014. *Thismia mucronata* (Thismiaceae), a new species from Southern Vietnam. *Phytotaxa* 167(3): 245–255. doi: [10.11646/phytotaxa.167.3.3](https://doi.org/10.11646/phytotaxa.167.3.3)
- Ribeiro, J.F. and B.M.T. Walter. 2008. Fitofisionomias do Bioma Cerrado; pp. 151–199, in: S.M. Sano, S.P. Almeida and J.F. Ribeiro (eds.). *Cerrado: Ecologia e Flora*. Planaltina, DF: Embrapa, CPAC.
- Truong, L.H., N.T. Tich, T. Gioi, D.Q. Diep, V.N. Long, N.L.X. Bach, N.T.T. Dung and N.T. Trung. 2014. *Thismia okhaensis* (Thismiaceae) — a new fairy lantern from Vietnam. *Phytotaxa* 164: 190–194. doi: [10.11646/phytotaxa.164.3.4](https://doi.org/10.11646/phytotaxa.164.3.4)
- Voloschen, T.D., M.E. Engels, P.A.C.L. Assunção and E.C. Smidt. 2013. *Thismia singeri* (Thismiaceae), an augmented description and first record for Brazil. *Brazilian Journal of Botany* 36(4): 309–312. doi: [10.1007/s40415-013-0037-y](https://doi.org/10.1007/s40415-013-0037-y)

Author contributions: FAGG, CPC, LFS and DCG collected the data. ECS, CPC and FAGG identified the specimen. FAGG, ECS, CPC and LFS wrote the text.

Received: 4 June 2015

Accepted: 5 April 2016

Academic editor: Guilherme Dubal dos Santos Seger